

REVIEWS

Alain Arrault and Catherine Jami (eds.), *Science and Technology in East Asia. Proceedings of the XXth International Congress of History of Science [Liège, 20-26 July 1997]*. Turnhout: Brepols, 2001. 153 pp.

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The majority of the articles collected in this slim volume were contributions to a symposium titled “Global history of science: A Symposium dedicated to Joseph Needham”, which was organized at the 20th International Congress of History of Science in Liege, Belgium. They are supplemented by four other papers read at the congress related to the history of science and technology in East Asia. The papers cover a range of interesting topics and can be roughly divided into two groups. The first group is focussed on Joseph Needham, his work and his “great question”, while the second deals with assorted themes related to the history of science in East Asia.

The book begins with a paper by Gregory Blue on Needham’s heterodox Marxism and Chinese science. Blue reminds us of the importance that Boris Hessen’s paper on “The Social and Economic Roots of Newton’s ‘Principia’” given at the Second International Congress of the History of Science held in London in 1931 exerted on Needham’s approach to history of science. Given its importance, this “catalytic event”¹ has been subjected to intense research and, already during his lifetime, Needham’s assumption that Hessen’s fate is “not so precisely known”, as quoted by Blue (p. 16), was not completely accurate. Blue shows that in many other areas Needham’s Marxism was heterodox, since he adopted the notion of the “Asiatic Mode of Production”, which at this time had been rejected by Stalin. Blue does not think, however, that Needham’s “great problem”, namely why China did not develop capitalism and science, developed

¹ Young, Robert M. (1990), “Marxism and the History of Science”, in Olby, R.C., G.N. Cantor, J.R.R. Christie, and J.S. Hodge (eds.), *Companion to the History of Modern Science*, London, New York: Routledge, pp. 77-86, p. 80.

from his Marxism. Blue instead suggests Weber as a possible precedent. But it might well be that the Weberian influence was indirect and mainly exerted on Needham through Wittfogel, whose influence on Needham Blue rightly stresses. Wittfogel's book contains a brief chapter on just this question under the heading "Frühkapitalistische Ansätze—aber keine Naturwissenschaft" (Early capitalist departures but no natural science), in which he on the one hand briefly touches on some of the accomplishments of Chinese science, especially in mathematics, yet on the other stresses that the lack of a capitalistic development resulted in the fact that "mechanics was not constituted as a special science."² While Needham, of course, claims that at least parts of his "grand question" were conceived as early as 1938, his meeting with Wittfogel in 1943 might have had some influence on the formulation of the question in its more elaborated form. Ulmen has drawn attention to the fact that Needham himself had Wittfogel's passage on the sciences translated into English and had made it available to his collaborators.³ In addition, we know from Zhu Kezhen that in 1944, when Needham discussed an early form of his "grand question" with Chinese scientists at Meitan,⁴ he actually offered a very Wittfogelian explanation, listing four major factors that inhibited the emergence of modern science in China, namely geography, climate, economy and society. Needham also stressed that the factors "economy" and "society" were related to the fact there was no commercial class in traditional China.⁵ We may note incidentally that at this time Wittfogel also directly influenced Chinese historians of science such as Zhu Kezhen 竺可楨, since the passage, which Needham had had translated into English, was translated into Chinese and published under the title "Why didn't China produce Natural Science" (*Zhongguo weishenme meiyou chansheng ziran kexue* 中國為什麼沒有產生自然科學).⁶ Given the importance of Marxism for Needham, it is to be hoped that fur-

² Cf. Wittfogel, Karl A. (1931), *Wirtschaft und Gesellschaft Chinas. Versuch der wissenschaftlichen Analyse einer grossen asiatischen Agrargesellschaft*, Leipzig: C.L. Hirschfeld, p. 684.

³ Ulmen, G. L. (1971), *The Science of Society. Toward an Understanding of the Life and Work of Karl August Wittfogel*, The Hague, Paris, New York: Mouton, p. 371.

⁴ On Needham in Meitan see Xu Weimin 許為民, Zhang Fanghua 張方華 (2001), "Li Yuese yu Zhejiang daxue" 李約瑟與浙江大學 (Needham and Zhejiang University), *Ziran bianzhengfa tongxun* 23.3: 65-68.

⁵ Cf. Zhu Kezhen 竺可楨 (1984), *Zhu Kezhen riji* 竺可楨日記 (The Diary of Zhu Kezhen), Beijing: Renmin chubanshe, Volume 2, pp. 789-790.

⁶ The translation was done by Wu Zaoxi 吳澡溪, probably from the Japanese translation of Wittfogel's work. It is still not entirely clear when and where this translation was first published, most likely in 1944 at the latest. A recent reprint of the article is based on the 1946 edition published in Wu Zaoxi, *Kexue yundong wengao* 科學運動文稿, Shanghai: Nongcun kexue chubanshe, cf. Weitefu 魏特夫 (2002), "Zhongguo weishenme meiyou chansheng ziran kexue" 中國為什麼沒有產生自然科學, in: Liu

ther research on Needham and his work will give additional information on the problem, as for example how Needham's views may have changed vis-à-vis important developments such as the rise of fascism during the 1930s or the Communist takeover in China in 1949.

H. Floris Cohen's paper on "Joseph Needham's Grand Question and How to Make it Productive for our Understanding of the Scientific Revolution" highlights some of the issues Cohen has discussed at length in his *opus magnum* from 1994.⁷ He comes to the conclusion that even if Needham in a certain sense had used the "Chinese experience" as a control experiment for Europe, and especially for the Scientific Revolution, in spite of all his efforts, in the end Needham failed to answer his grand question of why the scientific revolution did not take place in China. Cohen suggests, by using insights provided by David Landes, that on the basis of Needham's own writings one could say that "China had no Scientific Revolution because such an outcome was not contained in the developmental possibilities of an organic approach to nature in the 'correlative' mode of the Chinese." (p. 28). He states too that Needham in many instances, when he wrote about his grand question, tended to lose his cautious stance apparent in most of *Science and Civilisation in China* and became a "somewhat outrageous proselytizer and historiographical extremist" (p. 27). Cohen acknowledges however, Needham's inspiration for cross-culturally comparative history of science. Cohen himself admits that he is an outsider on "matters Chinese". For the present reviewer it is striking that it is precisely "outsiders" like Cohen who often consider notions such as China's supposed "organic materialism", Needham's treatment of Daoism and the supposed possibilities contained in the Mohist Canons and Expositions as Needham's main contributions to their own understanding of the Chinese experience. It is well known that almost from the beginning of the publication of *SCC* some of these points were among those most criticised by a number of sinologist reviewers.⁸

In his paper on "Needham's Vision of the Encounter of China and Europe: The Case of the History of Botany", G. Métaillé raises some fundamental objections regarding the methodology employed by Needham. Métaillé points out that Needham's assumption of the trans-current point in Chinese botany, e.g. the point

Dun 劉鈍, Wang Yangzong 王揚宗 (eds.), *Zhongguo kexue yu kexue geming. Li Yuese nanti jiqi xiangguan wenti yanjiu lunzhu xuan* 中國科學與科學革命。李約瑟難題及其相關問題研究論著選 (Chinese science and the scientific revolution. A selection of academic publications on the Needham riddle and related issues), Shenyang: Liaoning jiaoyu chubanshe, pp. 36-44.

⁷ Cf. Cohen, Floris (1994), *The Scientific Revolution: A Historiographical Inquiry*, Chicago: University of Chicago Press, p. 680.

⁸ See for example Wright, Arthur F. (1957), "Review of Science and Civilisation in China. Volume II, History of Scientific Thought", *The American Historical Review* 62.4: 918-920, and Levy, Marion J. (1958), "Some Light on the Far East", *World Politics*, 10.3: 462-474.

when the modern form decisively overtook the traditional form, which Needham puts at around 1780, and the fusion point between Chinese and Western botany, which Needham sets at 1880, cannot be supported. He points out that modern botany did not reach China before the beginning of the twentieth century and stresses the futility of analyzing how traditional Chinese scholars dealt with plants on the basis of a modern conception of botany. According to Métaillé, it might be more efficient to use a concept of ethno-botany, which allows the study Chinese botany on its own terms, and then in a second step proceed to a comparative analysis between the Chinese and Western traditions. Implicitly, Métaillé is critical of Needham's approach to botany because it almost completely neglects the analysis of processes by which the transmission of knowledge came about in modern times, which, of course, was instrumental for establishing modern scientific disciplines in China.

Peter Golas got the inspiration for his essay on "Technological Illustration in China. A Post-Needham Perspective" from the abundance of illustrations in *SCC*. Golas tries to describe the character and the limitations of Chinese technical drawings. He notes that by no means all drawings that depict machines or implements can be considered technical drawings. He stresses that many of the illustrations of machines or implements had a didactic intention and did not serve the purpose of assisting in the construction of the machines. Moreover Golas notes that in China there was no tradition of using drawings to think through an engineering idea. Arguably, it might be useful to further elaborate his approach and think anew about the relationship between those who actually worked with machines and those who wrote about machines or published illustrations of machines and implements.⁹

In their paper "Influence of Islamic Astronomy in Song and Yuan China", Sun Xiaochun and Jakob Kistenmaker, mainly on the basis of previous work by Hartner and Ma Jian, show how Islamic astronomy may have influenced Chinese Astronomy in Yuan times and maybe earlier. They point out that there was influence in respect to instrument-making, most likely on the instruments devised by Guo Shoujing 郭守敬, as well as on concepts and books, which were of considerable importance for the development of Chinese astronomy. When Chinese astronomers came into contact with Western astronomy during the late Ming,

⁹ Linqing for example, who served as director general of the administration of waterways during the Daoguang reign and published a very well known illustrated description of tools and implements used in river hydraulic writes that when he inspected the dikes of the Yellow River he often saw tools which he did not know and function of which was not clear to him. Because of this he decided to publish his book with illustrations—i.e. illustrations that probably would be termed by Golas as "technical illustrations". Cf. Linqing 麟慶, *Hegong qiju tushuo* 河工器具圖說 (Illustrated description of tools and implements used for river hydraulics), *Zhongguo shuili yaoji congbian* 4, Taipei: Wenhai, 1969 (Reprint of the 1836 edition), preface, pp. 1b-2a.

however, Islamic astronomical knowledge was replaced by the superior knowledge from Europe.

In his paper "Some Reflections on the Western Scientific Tradition from the East Asian Perspective" Kim Yung Sik defends "big questions" such as the comparison between the scientific developments of different cultures. Despite the criticism they have been exposed to, Kim Yung-Sik holds that "big questions" are nevertheless a very useful heuristic device. This reviewer, however, remains somewhat sceptical. It is hard to understand, for example, why Kim on the one hand warns against comparing concepts such as "time, causality" etc. (p. 77), yet on the other does not see a problem in applying concepts such as "philosophy" and "religion", or terms like "intellectuals" and "scientists" for his comparative enterprise, without having made sufficiently clear what he associates with them. I am not convinced either that for observations such as "the occasional tensions in the medieval West between natural philosophy and [...] the church seem to have been significant" (p. 78) an elaborated framework of comparison is necessary. Kim claims that one of his insights from comparison is that one should look into the "shift of scientific superiority within one culture from one place to another" (p. 82). He then points out that in what he calls the "Chinese cultural world" China was always the centre and that significant developments from there spread to the periphery, by which he seems to mean Korea and Japan. Such assertions, however, tend to cancel out all differences in China itself (with which the historian at least should be acquainted with since Skinner's seminal work) and ignore research on the question of how intellectual, cultural or "scientific" activities are related to the social, intellectual, political and natural environment of certain localities *within China proper*, one of the more exciting tendencies in recent research on history of science and technology in China.

Togo Tsukahara's, Keizo Hashimoto's and Noriaki Matsumura's brief paper on "Needham's Impact on Japanese History of Science" mainly focuses on the collaboration of Needham and Yabuuti Kiyoshi and his students. The paper stresses that part of Needham's attractiveness for Japanese scholars were his leftist political inclinations. The paper rightly points out that any translation of Needham into Chinese or Japanese is an intellectually stimulating challenge since Chinese and Japanese translators need to come to terms with basic concepts that are often left "untranslated" in Chinese and Japanese.

In his article "Cognitive Homologies in the Studies of Science in Indian Antiquity: A Historiographic Axis of the *Indian Journal of History of Science*" Dhruv Raina provides the reader with an instructive picture of the development of the historiography of science in India. He points out that it is linked to political and cultural agendas that have changed over the course of time. He stresses the nationalist background of the earlier phase of historiography of science in India, which, however, was influenced by "the relics of the Orientalist tradition" (p. 98) and thus in the last analysis was "Eurocentric" since it attempted to translate the methodology of the knowledge systems of ancient India in terms of the precepts of modern science. He also shows that the contributions to the *Indian Journal of*

History of Science were closely related to the scientific outlook of the Nehru period. In her introduction, Jami rightly suggests that the “features of the historiography of science in India parallel some that characterize Needham’s approach” (p. 9). To the present reviewer it seems that Raina’s brief paper could be equally instructively used for looking into the historiography of science and technology in China itself. The “bug of priority”, which according to Raina makes it “difficult to decipher when it was cognitive justice that was meted out, and when the narrative was lapsing into chauvinism” (p. 100) certainly is a prominent feature of Chinese historiography of science and technology as well. So, when he stresses that historiography of science as presented in the *Indian Journal of History of Science* was an “archaeological undertaking of bringing forth the buried traditions, knowledge, and nuggets of culture”, one is reminded not only of Hu Shi’s discovery of the logical method in China and his efforts to “reorganize the Chinese past” (*zhengli guogu* 整理國故), but of the writings of many Chinese historians of science, although, of course, in the Chinese case Soviet influence needs to be taken into account for the period between 1949 and the late 1970s.

In her contribution “Why *The Classic of Mountains and Seas (Shan Hai Jing)* contains Topographical Inaccurate Data”, Vera Dorofeeva-Lichtmann focuses on the fact that up to now studies of the *Shanhaijing* have failed to match the data given in the *classic* with actual geographic locations. She argues that this failure was basically caused by the assumption that the main purpose of the *Shanhaijing* was to convey topographical reality. By contrast, Dorofeeva-Lichtmann believes that the *Shanhaijing* presented the terrestrial surface as a sort of “spiritual landscape”, a point she corroborates by drawing attention to the similarity of the spatial distribution of deities mentioned in the “summaries” of the *Shanhaijing* to that provided in the Chu Silk manuscript, as well as to the layout of astronomical instruments such as the *shi*, which had the goal of conveying a “sacred cosmography”.

In his “Pensée correlative et arithomologie en Chine. Le cas de Shao Yong (1012-1077)” Alain Arrault analyses the numerological model developed by Shao Yong in his “Guanwu pian”. He highlights the cosmological nature of the model, drawing special attention to the distortions Shao Yong had to impose in order to fit his treatment of phonology to his model. His main point, however, is that Shao Yong’s numerological speculations cannot be considered to be just a repetition of prior numerological approaches or a system of symbols, but rather that it constitutes a real—and quite elaborate—model on its own merits.

The paper by Chen Meidong entitled “The Argument between Right-rotation and Left-rotation theory of the Sun, the Moon and the Five Planets in Ancient China” offers a brief description of the different assumptions on the direction of movement of the sun, the moon and the planets in traditional China. He points out that the dominant explanation shifted several times during the course of Chinese history and that these shifts were mainly due to cosmological or political reasons. He finally points out that it was Wang Xichan who offered the most convincing arguments supporting the right-rotation theory. Chen fails, however,

to analyze to what extent Wang's explanation may have been influenced by Western scientific knowledge and the impact this had on Qing cosmology.

The book is concluded by a contribution from Ken'ichi Sato on "The Acceptance of Proportional Expression in Japan". Sato points out that while proportional expression was known in China since the end of the sixteenth century and imported into Japan during the eighteenth century, in Japan it only was used for rather limited purposes. Sato shows that this was due to the attractiveness of the traditional Japanese method of "cross-multiplication" (*ijō-hō*), which in the eighteenth century was popularized among amateur mathematicians. Interestingly however, the Chinese term for "proportional expression" (*bilishi* Japanese *hirei-shiki*) in Japan was borrowed as a name for the "cross-multiplication" method.

As a whole the book offers an interesting mixture of articles that shed light on issues of the development of the discipline and some of its most important problems, as well as providing insights into the state of current research. As such it constitutes a contribution that will help to underline the importance of the East Asian experience as an indispensable part of the history of science and technology.